Título de la nota 20/06/2023

Adecuabilidad

$R \geq 2$ $k' \geq 2$

$N \geq 2000$ $As = 1$

$CV \leq 1.5\%$

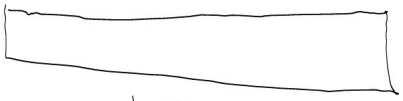
$N = 2000$ $dp = 5\mu m$

$L = 15\,cm$

$\frac{15\,cm}{2000} =$

$1\mu m = 10^{-6}\,m$

$1\,cm = 10^{-2}\,m$



15 cm

$7.5 \times 10^{-3}\,cm$

$$(75 \times 10^{-3}\,\cancel{cm})\left(\frac{1\,\cancel{cm}}{10^{2}\,\cancel{m}}\right)\left(\frac{1\,\cancel{m}}{10^{6}\,\mu m}\right)$$

$75\,\mu m$

$$N = \frac{L}{H}$$

$$H = \frac{L}{N} = \frac{cm}{}$$

α selectividad $\alpha = 1$ no hay separación

$$\alpha = \frac{k'_2}{k'_1} \qquad \alpha > 1$$

$$R = \frac{\sqrt{N}}{4}$$

$N = 16$ $N = 64$

$$R = \frac{\sqrt{16}}{4} = \frac{4}{4} = 1$$

$$R = \frac{\sqrt{64}}{4} = \frac{8}{4} = 2$$

$$V_T = \pi r^2 L$$
$$= (3.1416)(15\,cm)(0.23\,cm)^2$$
$$= 2.4928\,cm^3 = mL$$

$$V_0 = 0.65\,V_T$$
$$= 0.65\,(2.4928\,mL)$$
$$= 1.6203\,mL$$

$$t_0 = \frac{V_0}{F} = \frac{1.6203\ mL}{1.0\ mL/min}$$

$$= 1.6203\ min$$

$$V_S = V_T - V_0$$

$$= 2.493\ mL - 1.62\ mL$$

$$= \underline{0.872\ mL}$$

$$V_r = t_r F$$

$$= (4\ min)\left(\frac{1\ mL}{min}\right)$$

$$= 4\ mL$$

$K \frac{V_s}{V_m}$ = factor de capacidad = k′

$$K = \frac{k' V_m}{V_s} \qquad k'_1 = \frac{t_r - t_o}{t_o}$$

$$= \frac{4\ min - 1.62\ min}{1.62\ min}$$

$$= 1.469$$

$$\alpha = \frac{k'_2}{k'_1} = \frac{2.703}{1.469}$$

$$= 1.839$$

$K \frac{V_s}{V_m}$ = factor de capacidad = k′

$$K = k' \left(\frac{V_r}{V_s}\right)$$

$$= 1.469 \left(\frac{4\ mL}{0.872\ mL}\right) = 6.73$$

$$\Delta P = \frac{u \eta L \cancel{\Phi}}{d_p^2}$$

$$\frac{\left(\frac{cm}{s}\right)(Pa\,s)(cm)}{(cm)^2} = Pa$$

$$\left(5\,\cancel{\mu m}\right)\left(\frac{1\,\cancel{m}}{10^6\,\cancel{\mu m}}\right)\left(\frac{1\,cm}{10^{-2}\,\cancel{m}}\right)$$

$$= 5 \times 10^{-4}\,cm$$

0.5 cp

$1\ cp = 1 \times 10^{-3}\ Pa \cdot s$

$0.5\ cp = 5 \times 10^{-4}\ Pa\ s$

$$u = \frac{L}{T_0} = \left(\frac{15\ cm}{1.62\ min}\right)\left(\frac{1\ min}{60\ s}\right) = \frac{0.154\ cm}{s}$$

$$\Delta P = \frac{(5 \times 10^{-4}\ Pa\ s)(15\ cm)(500)\left(0.154\ \frac{cm}{s}\right)}{(5 \times 10^{-4}\ cm)^2} = 2.3143 \times 10^{6}\ Pa$$

$$= \left(2.3143 \times 10^6 \text{ Pa}\right)\left(\frac{1 \text{ atm}}{1.01325 \times 10^5 \text{ Pa}}\right)$$

$$= \underline{22.84 \text{ atm}}$$

$$N = 5.54 \left(\frac{t_{r_1}}{w_h}\right)^2$$

$$= 5.54 \left(\frac{4 \text{ min}}{0.2 \text{ min}}\right)^2$$

$$= 2216$$

$$N = 5.54 \left(\frac{t_{r_1}}{W_h}\right)^2$$

$$= 5.54 \left(\frac{6\ min}{0.25\ min}\right)^2$$

$$= 3191$$

$$H = \frac{L}{N} = \frac{15\ cm}{2216}$$

$$= 0.0067\ cm$$

$$= 67\ \mu m$$

$$h = \frac{H}{dp} = \frac{67\,\mu m}{5\,\mu m} = 13.54$$

$$h = \boxed{4-10}$$

$$Wh_1 = 2.36\sigma$$

$$= 2.36\sigma = 0.2\,min$$

$$\sigma = \frac{0.2\,min}{2.36\,min} = 0.084$$

$$\sigma = 0.084$$

$$Wb = 4\sigma = 4(0.084\,min)$$
$$= 0.33\,min$$

$R = 2(t_{R,2} - t_{R,1}) / (w_{b,1} + w_{b,2})$

$$R = \frac{t_{r2} - t_{r1}}{\left(\frac{Wb_2 + Wb_1}{2}\right)} = \frac{(6\,min - 4\,min)}{\frac{(0.34 + 0.42)\,min}{2}}$$

$$= 5.24$$

$$t_a = t_{r_2} + 4\sigma$$

$$= 6\ min + 0.42\ min$$

$$= 6.42\ min$$